AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-28. (Canceled)

29. (Currently amended) A crystal growth method for adding or crystallizing nitrogen in a crystal supported by a substrate, comprising:

supplying aluminum and ammonium (NH_3) directly onto a surface of the crystal,

wherein addition or crystallization of the nitrogen from the ammonium which is supplied directly onto the surface of the crystal into the surface of the crystal is accelerated by the aluminum supplied directly onto the surface of the crystal.

30. (Previously presented) A crystal growth method according to claim 29, wherein decomposition of ammonium and adsorption of nitrogen on a crystal surface is accelerated by aluminum.

31. (Previously presented) A crystal growth method according to claim 29, wherein the aluminum exists at least in an outermost surface of a growing layer.

32. (Previously presented) A crystal growth method according to claim 29, wherein an amount of nitrogen added to a crystal, a nitrogen composition, an amount of nitrogen adsorbed on a crystal surface and an amount of an element in the crystal surface which is substituted with a nitrogen atom are controlled based on an amount or composition ratio of added aluminum.

33. (Previously presented) A crystal growth method according to claim 29, wherein aluminum is added to or crystallized in a restricted region, whereby only in the restricted region, nitrogen is added or crystallized, a nitrogen atom is adsorbed, or an element in a crystal surface is substituted with a nitrogen atom.

34. (Currently amended) A crystal growth method according to claim 29, wherein a method selected from among a molecular beam epitaxial (MBE) growth method, ~~a metal organic molecular beam epitaxial (MO-MBE) growth method,~~ and a gas source molecular beam epitaxial (GS-MBE) growth method~~, and a chemical beam epitaxial (CBE) growth method~~ is used.

35. (Previously presented) A crystal growth method according to claim 29, wherein crystal growth of a III-V compound semiconductor including, as V group components, nitrogen and a V group element other than nitrogen is performed.

36. (Previously presented) A crystal growth method according to claim 35, wherein at least one of arsenic (As), phosphorus (P), and antimony (Sb) is selected as the V group element other than nitrogen.

37. (Previously presented) A crystal growth method according to claim 35, wherein a substrate temperature is in a range from 450^0C to 640^0C.

38. (New) A crystal growth method according to claim 29, wherein a surface of single crystal substrate is a crystal surface slanted from a (100) surface in a [011] direction (A direction) or a crystal face which is equivalent in a crystallographic sense to the slanted crystal surface.

39. (Previously presented) A crystal growth method according to claim 38, wherein the slant angle is within a range equal to 2^0 or more and equal to 25^0 or less.

40. (Previously presented) A crystal growth method according to claim 29, wherein one or more pairs of semiconductor layer A and semiconductor layer B are superposed, the semiconductor layer A including at least aluminum and nitrogen in its composition but not including indium in its composition, and the semiconductor layer B including at least indium in its composition but not including nitrogen in its composition.

41. (Previously presented) A crystal growth method according to claim 40, wherein the thickness of each of the semiconductor layers A and B is from one to ten molecular layers.

42. (Previously presented) A crystal growth method according to claim 29, wherein crystal growth is performed by applying a source material to a substrate in a crystal growth room which is evacuated of air, and a mean free path of a molecule of each source material is longer than a distance between the substrate and a source of the source material.

43. (Previously presented) A crystal growth method according to claim 29, wherein ammonium in the form of gas is used as a nitrogen source material, and a source material of another element is obtained by evaporating a solid of a single element.

44. (Previously presented) A crystal growth method according to claim 29, wherein ammonium in an undecomposed state is supplied as a nitrogen source material and decomposed on a surface of the substrate.

45. (Previously presented) A crystal growth method according to claim 29, wherein crystal growth is performed over an underlying (sub-strate) crystal which does not include nitrogen as a principal element.

46. (Previously presented) A crystal growth method according to claim 45, wherein the underlying (substrate) crystal is selected from GaAs, InP, GaP, GaSb, and Si.

47. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 29.

48. (Previously presented) A semiconductor device according to claim 47, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

49. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 38.

50. (Previously presented) A semiconductor device according to claim 49, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

51. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 40.

52. (Previously presented) A semiconductor device according to claim 51, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

53. (Previously presented) An apparatus which uses the semiconductor device of claim 47.

54. (Previously presented) An apparatus which uses the semiconductor device of claim 49.

55. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 42.

56. (Previously presented) A semiconductor device according to claim 55, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

57. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 43.

58. (Previously presented) A semiconductor device according to claim 29, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

59. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 44.

60. (Previously presented) A semiconductor device according to claim 59, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

61. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 45.

62. (Previously presented) A semiconductor device according to claim 61, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

63. (Currently amended) A crystal growth method for adsorbing a nitrogen atom on a surface of a crystal, the crystal including aluminum in the surface thereof, comprising steps of:

growing the crystal including the aluminum on the surface; and

supplying ammonium (NH_3) directly onto the surface of the crystal including the aluminum in the surface thereof,

wherein adsorption of the nitrogen atom generated by decomposition of the ammonium supplied directly onto the surface of the crystal is accelerated by the aluminum included in the surface of the crystal.

64. (Previously presented) A crystal growth method according to claim 63, wherein decomposition of ammonium and adsorption of nitrogen on a crystal surface is accelerated by aluminum.

65. (Previously presented) A crystal growth method according to claim 63, wherein the aluminum exists at least in an outermost surface of a growing layer.

66. (Previously presented) A crystal growth method according to claim 63, wherein an amount of nitrogen added to a crystal, a nitrogen composition, an amount of nitrogen adsorbed on a crystal surface and an amount of an element in the crystal surface which is substituted with nitrogen are controlled based on an amount or composition ratio of added aluminum.

67. (Previously presented) A crystal growth method according to claim 63, wherein aluminum is added to or crystallized in a re-stricted region, whereby only in the restricted region, nitrogen is added or crystallized, a nitrogen atom is adsorbed, or an element in a crystal surface is substituted with a nitrogen atom.

68. (Currently amended) A crystal growth method according to claim 63, wherein a method selected from among a molecular beam epitaxial (MBE) growth method, ~~a metal organic molecular beam epitaxial (MO-MBE) growth method,~~ and a gas source molecular beam epitaxial (GS-MBE) growth method~~, and a chemical beam epitaxial (CBE) growth method~~ is used.

69. (Previously presented) A crystal growth method according to claim 63, wherein crystal growth of a Ill-V compound semiconductor including, as V group components, nitrogen and a V group element other than nitrogen is performed.

70. (Previously presented) A crystal growth method according to claim 69, wherein at least one of arsenic (As), phosphorus (P), and antimony (Sb) is selected as the V group element other than nitrogen.

71. (Previously presented) A crystal growth method according to claim 69, wherein a substrate temperature is in a range from 450^0C to 640^0C.

72. (Previously presented) A crystal growth method according to claim 63, comprising a series of steps including at least steps of:

supplying a III group source material including aluminum of less than one atomic layer;

subsequently, supplying ammonium so as to adsorb nitrogen atoms of less than one atomic layer; and

supplying a source material of a V group element other than nitrogen,

wherein the series of steps are repeated one time or more.

73. (Previously presented) A crystal growth method according to claim 72, wherein in the step of supplying ammonium so as to adsorb nitrogen of less than one atomic layer, the source material of the V group element other than nitrogen is not supplied at the same time.

74. (Previously presented) A crystal growth method according to claim 72, wherein crystal growth is performed over a single crystal substrate in which a (100) surface is a principal plane.

75. (New) A crystal growth method according to claim 74, wherein a surface of single crystal substrate is a crystal surface slanted from a (100) surface in a [011]

direction (A direction) or a crystal face which is equivalent in a crystallographic sense to the slanted crystal surface.

76. (Previously presented) A crystal growth method according to claim 75, wherein the slant angle is within a range equal to 2^0 or more and equal to 25^0 or less.

77. (Previously presented) A crystal growth method according to claim 63, wherein one or more pairs of semiconductor layer A and semiconductor layer B are superposed, the semiconductor layer A including at least aluminum and nitrogen in its composition but not including indium in its composition, and the semiconductor layer B including at least indium in its composition but not including nitrogen in its composition.

78. (Previously presented) A crystal growth method according to claim 77, wherein the thickness of each of the semiconductor layers A and B is from one to ten molecular layers.

79. (Previously presented) A crystal growth method according to claim 63, wherein crystal growth is performed by applying a source material to a substrate in a crystal growth room which is evacuated of air, and a mean free path of a molecule of each source material is longer than a distance between the substrate and a source of the source material.

80. (Previously presented) A crystal growth method according to claim 63, wherein ammonium in the form of gas is used as a nitrogen source material, and a source material of another element is obtained by evaporating a solid of a single element.

81. (Previously presented) A crystal growth method according to claim 63, wherein ammonium in an undecomposed state is supplied as a nitrogen source material and decomposed on a surface of the substrate.

82. (Previously presented) A crystal growth method according to claim 63, wherein crystal growth is performed over an underlying (substrate) crystal which does not include nitrogen as a principal element.

83. (Previously presented) A crystal growth method according to claim 82, wherein the underlying (substrate) crystal is selected from GaAs, EnP, GaP, GaSb, and Si.

84. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 63.

85. (Previously presented) A semiconductor device according to claim 84, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

86. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 75.

87. (Previously presented) A semiconductor device according to claim 86, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

88. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 77.

89. (Previously presented) A semiconductor device according to claim 88, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

90. (Previously presented) An apparatus which uses the semiconductor device of claim 84.

91. (Previously presented) An apparatus which uses the semiconductor device of claim 88.

92. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 79.

93. (Previously presented) A semiconductor device according to claim 92, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

94. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 80.

95. (Previously presented) A semiconductor device according to claim 94, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

96. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 81.

97. (Previously presented) A semiconductor device according to claim 96, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

98. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 82.

99. (Previously presented) A semiconductor device according to claim 98, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

100. (Currently amended) A crystal growth method for substituting a portion of elements included in a crystal surface with nitrogen atoms, the surface of the crystal further including aluminum, comprising steps of:

growing the crystal; and

supplying ammonium (NH_3) and aluminum directly onto the surface of the crystal,

wherein substitution of the portion of the elements with the nitrogen atom from the ammonium supplied directly onto the surface of the crystal is accelerated by the aluminum included in the surface of the crystal.

101. (Previously presented) A crystal growth method according to claim 100, wherein decomposition of ammonium and adsorption of nitrogen on a crystal surface is accelerated by aluminum.

102. (Previously presented) A crystal growth method according to claim 100, wherein the aluminum exists at least in an outermost surface of a growing layer.

103. (Previously presented) A crystal growth method according to claim 100, wherein an amount of nitrogen added to a crystal, a nitrogen composition, an amount of nitrogen adsorbed on a crystal surface and an amount of an element in the crystal surface which is substituted with nitrogen are controlled based on an amount or composition ratio of added aluminum.

104.(Previously presented) A crystal growth method according to claim 100, wherein aluminum is added to or crystallized in a re-stricted region, whereby only in the restricted region, nitrogen is added or crystallized, a nitrogen atom is adsorbed, or an element in a crystal surface is substituted with a nitrogen atom.

105. (Currently amended) A crystal growth method according to claim 100, wherein a method selected from among a molecular beam epitaxial (MBE) growth method, ~~a metal organic molecular beam epitaxial (MO-MBE) growth method,~~ <u>and</u> a gas

source molecular beam epitaxial (GS-MBE) growth method~~, and a chemical beam epitaxial (CBE) growth method~~ is used.

106. (Previously presented) A crystal growth method according to claim 100, wherein crystal growth of a Ill-V compound semiconductor including, as V group components, nitrogen and a V group element other than nitrogen is performed.

107. (Previously presented) A crystal growth method according to claim 106, wherein at least one of arsenic (As), phosphorus (P), and antimony (Sb) is selected as the V group element other than nitrogen.

108. (Previously presented) A crystal growth method according to claim 106, wherein a substrate temperature is in a range from 450^0C to 640^0C.

109. (Previously presented) A crystal growth method according to claim 100, comprising a series of steps including at least steps of:

forming a 111-V compound crystal layer including at least one molecular layer of aluminum; and subsequently, supplying ammonium so as to substitute a portion of V group atoms in the 111-V compound crystal layer with nitrogen atoms, wherein the series of steps are repeated one time or more.

110. (Previously presented) A crystal growth method according to claim 100, comprising at least steps of:

crystal-forming a layered structure including at least a first semiconductor layer containing aluminum and a second semiconductor layer superposed thereon;

etching the layered structure while masking a portion of the layered structure such that the first semiconductor layer is exposed in a portion of an etched surface; and

supplying ammonium to the etched surface while heating the layered structure such that at least a portion of a constituent element in the first semiconductor layer is substituted with nitrogen.

111. (Previously presented) A crystal growth method according to claim 110, wherein the etched surface is a (nll)A surface (n= 1, 2 or 3).

112. (New) A crystal growth method according to claim 100, wherein a surface of single crystal substrate is a crystal surface slanted from a (100) surface in a [011] direction (A direction) or a crystal face which is equivalent in a crystallographic sense to the slanted crystal surface.

113. (Previously presented) A crystal growth method according to claim 112, wherein the slant angle is within a range equal to 2^0 or more and equal to 25^0 or less.

114. (Previously presented) A crystal growth method according to claim 100, wherein one or more pairs of semiconductor layer A and semiconductor layer B are superposed, the semiconductor layer A including at least aluminum and nitrogen in its composition but not including indium in its composition, and the semiconductor layer B including at least indium in its composition but not including nitrogen in its composition.

115. (Previously presented) A crystal growth method according to claim 114, wherein the thickness of each of the semiconductor layers A and B is from one to ten molecular layers.

116. (Previously presented) A crystal growth method according to claim 100, wherein crystal growth is performed by applying a source material to a substrate in a crystal growth room which is evacuated of air, and a mean free path of a molecule of each source material is longer than a distance between the substrate and a source of the source material.

117. (Previously presented) A crystal growth method according to claim 100, wherein ammonium in the form of gas is used as a nitrogen source material, and a source material of another element is obtained by evaporating a solid of a single element.

118. (Previously presented) A crystal growth method according to claim 100, wherein ammonium in an undecomposed state is supplied as a nitrogen source material and decomposed on a surface of the substrate.

119. (Previously presented) A crystal growth method according to claim 100, wherein crystal growth is performed over an underlying (substrate) crystal which does not include nitrogen as a principal element.

120. (Previously presented) A crystal growth method according to claim 119, wherein the underlying (substrate) crystal is selected from GaAs, InP, GaP, GaSb, and Si.

121. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 100.

122. (Previously presented) A semiconductor device according to claim 121, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

123. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 112.

124. (Previously presented) A semiconductor device according to claim 123, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

125. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 114.

126. (Previously presented) A semiconductor device according to claim 125, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

127. (Previously presented) A method for forming a semiconductor microwire structure wherein:

the crystal growth method of claim 110 is used when forming a semiconductor microstructure having a periodically-positioned wire pattern;

a diffraction grating is formed by the step of etching the layered structure while masking a portion of the layered structure such that the first semiconductor layer is exposed in a portion of an etched surface; and

a periodical wire structure is formed at a 1/2 of the pitch of the diffraction grating by the step of supplying ammonium to the etched surface while heating the layered

structure such that at least a portion of a constituent element in the first semiconductor layer is substituted with nitrogen.

128. (Previously presented) A method for forming a semiconductor microwire structure according to claim 127, wherein the wire structure is an absorptive diffraction grating section of a gain-coupled distributed feedback semiconductor laser having an absorptive diffraction grating, or a quantum wire.

129. (Previously presented) A method for forming a semiconductor microwire structure according to claim 127, wherein ammonium in an undecomposed state is supplied as a nitrogen source material and decomposed on a surface of the substrate.

130. (Previously presented) A method for forming a semiconductor microwire structure according to claim 127, wherein crystal growth is performed over an underlying (substrate) crystal which does not include nitrogen as a principal element.

131. (Previously presented) A method for forming a semiconductor microwire structure according to claim 130, wherein the underlying (substrate) crystal is selected from GaAs, InP, GaP, GaSb, and Si.

132. (Previously presented) An apparatus which uses the semiconductor device of claim 121.

133. (Previously presented) An apparatus which uses the semiconductor device of claim 123.

134. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 116.

135. (Previously presented) A semiconductor device according to claim 134, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

136. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 117.

137. (Previously presented) A semiconductor device according to claim 136, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

138. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 118.

139. (Previously presented) A semiconductor device according to claim 138, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

140. (Previously presented) A semiconductor device comprising a semiconductor layer formed by the crystal growth method of claim 119.

141. (Previously presented) A semiconductor device according to claim 140, wherein the semiconductor device is a light emitting element, and the semiconductor layer forms a light emitting layer thereof.

142. (New) The method of claim 29, wherein the substrate is at a temperature of 450 degrees C or more and less than 680 degrees C when the aluminum and ammonium are supplied directly onto the surface of the crystal.

143. (New) The method of claim 63, wherein the crystal is at a temperature of 450 degrees C or more and less than 680 degrees C when the ammonium is supplied directly onto the surface of the crystal.

144. (New) The method of claim 100, wherein the crystal is at a temperature of 450 degrees C or more and less than 680 degrees C when the aluminum and ammonium are supplied directly onto the surface of the crystal.